Keaton Donaghue

3100 Ousdahl Rd. Apt. 324 – Lawrence, Kansas,(66046)
astrokeaton.github.io
krdonaghue@ku.edu 316-755-8072

EDUCATION BACKGROUND

University of Kansas (KU) **Lawrence, Kansas**
Bachelor of Science, Physics and Astronomy; Minor in Music *May 2024*
3.78 Cumulative GPA
Honors College

RESEARCH EXPERIENCE

University of Hawaii **Honolulu, Hawaii**
REU in at the Institute for Astronomy with Dr. Gutcke and Dr. Shappee *May 2023-July 2023*

- Used LYRA, the highest resolution cosmological hydrodynamical simulation to date, to analyze the z=0 gas morphology of the five current runs.
- Verified simulation displayed gas mass and metallicity values comparable to z=0 dwarfs of similar size in stellar mass
- Showed that current hydrodynamical simulations don't properly account for elements that have a significant secondary (metalicity dependent) formation component.
- Gained immense experience in reporting and interpreting computational data in a way useful for observers
- Learned to use computer clusters for high-end computational work
- Gained writing experience through writing the results in the form of an Apj science paper
- work on the project continued after the completion of REU

University of Kansas (KU) **Lawrence, Kansas**
Undergraduate Researcher in Millimeter Astronomy with Dr. Mills *March. 2022-Present*

- Used data collected by ALMA and the VLA, including some of the first high-resolution ALMA Band 9 data, to measure various properties of embedded star clusters in the central starburst of NGC 253.
- Used the SpectralCube Python package to repixel and smooth different frequency images to analyze images with the same size and beam size.
- Used centroid fitting to redefine central cluster positions from different frequencies.
- Gained experience using the astropy and photutils python packages to create radial profiles to measure cluster properties such as size and peak intensity.
- Masked clusters in crowded areas to better constrain the flux and peak intensity of each source.
- Followed previous literature methods to measure the gas mass of each cluster across each frequency band.
- Created Spectral Energy Distribution profiles to better constrain the primary emission source and thus the relative age of the embedded clusters.
- Learned to use the imaging software DS9 to visually analyze images and determine regions of interest.

PROFESSIONAL EXPERIENCE

University of Kansas (KU) **Lawrence, Kansas**
Undergraduate Physics and Astronomy Ambassador *Fall 2023-Present*

- Wrote the job description after my initial proposal of the program was accepted
- Organized materials to be given to prospective students during visits such as pamphlets advertising faculty research
- Provided tours to prospective students and provided an undergraduate's perspective to being in the department

Institute for Astronomy (IfA) **Honolulu, Hawaii**
IfA REU Observing Experience *Summer 2023*

- Sat in on a grad student's observing time of protoplanetary disks in the mid infrared
- Used Keck II/NIRSPEC+AO
- gained insight into how astronomical data is taken and how remote observing is used to operate scientific instruments

University of Kansas (KU) **Lawrence, Kansas**
Undergraduate Physics Representative for the Department *Fall 2022-Present*

- Served as a representative of the physics and astronomy undergraduate body in department meetings.
- Proposed the creation of the KU Physics and Astronomy Student Ambassador program
- Participated in the undergraduate committee meetings to develop policies pertaining to undergraduate course requirements and assisted in developing a course outlook plan for each course

University of Kansas (KU) **Lawrence, Kansas**
Society of Physics Students KU Chapter President *May 2022-Present*

- Organized and planned biweekly for the Society of Physics Students.
- collaborated with the graduate student organization to organize social activities for students.
- organized and ran special sessions to advertise REUs and how to apply for students
- invited professors to come and speak about their research and how students can get involved.
- Organized and acquired funding for members to attend Physcon 2022 held in Washington D.C.
- Greatly increased student membership and participation by advertising social SPS events and conducting outreach in undergraduate classes.

TEACHING EXPERIENCE

University of Kansas (KU) **Lawrence,Kansas**
Modern Physics Teaching Assistant *Spring 2023- Present*

- Graded student assignments and provided feedback for improvement.
- assisted in proctoring exams
- held office hours to provide additional reinforcement of material taught in class through discussion and practice problems.

University of Kansas (KU) **Lawrence,Kansas**
Algebra Based Physics Teaching Assistant *Fall 2022- Winter 2022*

- Graded student assignments and provided feedback for improvement.
- Answered student's questions regarding homework problems

University of Kansas (KU) **Lawrence,Kansas**

Outside Physics Tutor *Spring 2022- Fall 2022*

- Worked as a private tutor for students in PHSX 114, PHSX 115, and occasionally PHSX 211.
- Provided additional reinforcement of material taught in class through further examples and helping students through their own thought process. Helped students achieve grades desired.

TALKS

Institute for Astronomy REU Research Symposium **Honolulu, Hawaii**
"LYRA 4: Merger-driven Gas Morphology of a Local Group Dwarf Analog" *July 2023*

University of Kansas Summer Student Research Symposium **Lawrence, Kansas**
"Multiwavelength Study of Clusters in the Central Starburst Region of NGC 253" *August 2022*

- Presented preliminary results of my multiwavelength study of NGC 253 to an audience of fellow undergraduates and research advisors

POSTERS

243rd Meeting of The American Astronomical Society **New Orleans, Louisiana**
Summer 2023 IfA REU poster *January 2024*

241st Meeting of The American Astronomical Society **Seattle, Washington**
"Radio and Sub-millimeter multiwavelength study of SSCs in NGC 253" *January 2023*
https://aas241-aas.ipostersessions.com/?s=66-07-21-A4-FC-08-89-75-53-B8-90-DB-48-D7-E9-08

OUTREACH

University of Kansas **Lawrence, Kansas**
Hawkfest Planetarium Showcase *August 2023*

- Helped run the front table for the KU Physics and Astronomy Planetarium.

Hillcrest Elementary School **Lawrence, Kansas**
Hillcrest Elementary School Science Expo *April 2023*

- Organized an SPS group to show off physics demos to elementary school students

Sunset Hill Elementary School **Lawrence, Kansas**
Sunset Hill Elementary School Science Expo *April 2023*

- Organized an SPS group to show off physics demos to elementary school students.

University of Kansas (KU) **Lawrence, Kansas**
KU Carnival of Chemistry *November 2022*

- Coordinated with the event coordinator to have SPS participate in the carnival of chemistry
- Requested and organized the demos used at the event.
- Coordinated the SPS stations at the event and ensured students knew how to explain their demos to youth typically in elementary and middle school.

Sunset Hill Elementary School **Lawrence, Kansas**
Sunset Hill Elementary School Science Expo *April 2022*

- Organized and ran simple physics computer demos that allowed elementary students to interact

with physical systems.

HONORS AND AWARDS

University of Kansas (KU) **Lawrence, Kansas**
Gene E Feaster Scholarship *Received May 2023*

- Awarded to two to three physics or astronomy undergraduates who have shown outstanding academic achievement.
- Highest undergraduate physics award given by the department.

University of Kansas (KU) **Lawrence, Kansas**
J.D. Stranathan Oustanding Student in Physics Scholarship *Received May 2022*

- Awarded to two rising junior/senior level physics students in strong academic standing and who actively pursue research.
- Students are nominated anonymously

University of Kansas (KU) **Lawrence, Kansas**
Sigma Pi Sigma member *Inducted April 2023*

TECHNICAL SKILLS

- Extensive knowledge of Python and Python Packages including Numpy, pandas, and scipy.
- Extensive knowledge of astronomy-specific python packages including astropy and photutils.
- Extensive knowledge of reading and manipulating data from fits files.
- Knowledge of reading and manipulating data from data cubes.
- Knowledge of LaTeX formatting and writing in LaTeX as well as BibTex formatting.
- General knowledge of HTML
- Member of a KU Jazz combo, saxophone soloist
- Member of KU Jazz ensemble 2, Baritone saxophonist, Fall 2020-Fall 2021
- Member of KU Symphonic Band, Baritone saxophonist, Fall 2020-Fall 2021